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Assessment of the impact of socio- demographic status and maternal age on pregnancy outcomes: Cross sectional study in a major tertiary maternity hospital in Sudan over a two-year period

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There is a relationship between adverse pregnancy outcome and low socio demographic status. However, maternal age alone is capable of affecting pregnancy outcome for both mothers and their newborn. The aim of this study is to assess the effect of socio- demographic status and maternal age on perinatal outcome in women who delivered in Omdurman Maternity Hospital (a major maternity unit in Sudan with over 30 thousand deliveries per year). A hospital based cross-sectional study was conducted in Omdurman Maternity Hospital. A sample of 384 pregnant women (<20, 20-30, >35 years old), attending the hospital for delivery were chosen (50% from the public section and 50% from private suites). Data were obtained by interviewing mothers using a specifically pre-coded and pre-tested designed questionnaire, and checklist for socio-demographic factors (residence, region, housing, level of education, occupation, husband's education, husband's occupation and family income). The association of explanatory variables with dependent variable was examined using binary logistic regression models. Mothers with low socio-demographic status and advanced maternal age had significantly higher rates of complications compared to those with high income, 3.165, CI 95% (1.249-8.022). This is statistically significant with P value of 0.015<0.05. Socio-economic status and maternal age play an important role on maternal and prenatal adverse outcomes. Improving socioeconomic factors such as having better life standards (occupation, family income and housing), attaining higher levels of education and health education, could help decrease the adverse outcomes on mothers and neonates.

Key words: Adolescent mothers, elderly mothers, socio-demographic factors, adverse outcomes.

INTRODUCTION

Pregnancy during adolescence often leads to poor outcomes for both mother and child. Adolescent childbearing is best defined as giving birth at 15 years or younger. Adolescent childbearing is commonly related to

social problems such as poverty, isolation, low level of education and unemployment (Katie and Hora, 2020). A combination of factors such as poor nutrition, low socio-economic status and pregnancy at extreme age (young teenagers and pregnancy in women over the age of forty) expose women to serious health risks during pregnancy and childbirth including damage to the reproductive tract and other complications such as anemia, postpartum hemorrhage, preeclampsia, low birth weight, prematurity and fetal death (Bilano et al., 2014).

Previous studies have shown conflicting results about the adverse effects of pregnancies, whether caused by biological immaturity or poor socio-environmental factors (Burley et al., 2018). Adolescent pregnancy is an important health problem in many countries. Each year, an estimated 14 million adolescents aged 15 to 19 years are responsible for around 10% of all births worldwide. More than 90% (12.8 million) of these female adolescents live in developing countries (Burley et al., 2018; Betran et al., 2013). Girls less than 20 years old have fewer antenatal care visits compared to those more than 20 years old, and they are more socially deprived (poorer, less educated and unemployed). The above is the reason why age itself might not be the major risk of adverse pregnancy outcomes, and maybe the real contributing factors are the unfavorable socio-demographic factors (Darmstadt et al., 2008; Adali et al., 2010).

Several studies conducted in African countries concluded that adolescent pregnancies are associated with increased fetal and maternal adverse outcomes (LBW, prematurity, neonatal death and maternal preeclampsia) due to maternal factors such as age, less antenatal care visits and mothers being unemployed. In a study conducted in South Africa in 2012, it was concluded that the risk factors associated with teenage mothers are poverty, low educational level (61.6% had secondary education) and unemployment (36.4%) (Mchunu et al., 2012). There is a strong relationship between adolescent pregnancy with low socio-economic status, low educational level, fewer antenatal care visits and perinatal complications, and these were the outcomes of the study conducted in Malaysia (Hashim et al., 2010). Adolescent pregnancy is a major health problem having socio-economic effects on the mother and on the community. The global network's maternal newborn health registry study conducted in six low-middle income countries, about adverse maternal and perinatal outcomes in adolescent pregnancies, concluded that teenage pregnancy is associated more with worse perinatal outcomes. These outcomes increase due to many factors such as biological immaturity, socio-economic factors and inadequate antenatal or delivery care (Althabe et al., 2015).

In South Asia, a study on factors associated with teenage pregnancy showed that socio-economic factors, low educational level, cultural and family structure were all considered risk factors of teenage pregnancy, and the

consequences of this were adverse maternal and neonatal outcomes (Acharya et al., 2019). A study conducted in Nepal concluded that adolescent pregnancy is also associated with neonatal mortality as an adverse outcome, and this risk is related to the low socioeconomic status among mothers (Darmstadt et al., 2008). Another study showed that young pregnant mothers are more likely to have inadequate antenatal care attendance and increased risks of low birth weight and preterm labor (Almeida and Aquino, 2011; Fletcher and Wolfe, 2009). Pregnant adolescent girls failed to complete their education (70.5%) compared to those without pregnancy (25.6%). The effect of family income on the completion of education was aggravated by pregnancy among adolescents in South America (Fletcher and Wolfe, 2009). Adolescent and older mothers are both at risk of facing adverse maternal and neonatal outcomes during labor, such as preterm labor, IUGR, infant mortality and still birth. All these outcomes are associated with many factors such as low socioeconomic status, low educational level and high parity (Barros et al., 2015). Teenage mothers had reduced probability of continuing to receive high school diploma, and had a lower level of economic status (Fletcher and Wolfe, 2009). The main aim of this paper is to study the impact of socio demographic status and maternal age on pregnancy outcomes. This study was conducted because of the serious effects of such factors on maternal mortality and morbidity in our society.

METHODOLOGY

Study design, setting, period and data source

This is a cross-sectional hospital-based study, conducted at Omdurman Maternity Hospital in both public section and private suites. The study setting included Khartoum and different regions of Sudan (North, South, East, and West), and covered the period from July 2018 - March 2019.

Sampling design and study population

The sample size was 384 cases; half of the sample size (192 cases) was selected from the public section and the other half (192 cases) from private suites. The study population consisted of selected pregnant women, who attended Omdurman maternity hospital for "Normal Spontaneous Vaginal Delivery" from October to December 2018.

Exclusion and inclusion criteria

Pregnant women who had miscarriage or had a cesarean section were excluded from the study.

Data collection procedure

Data were collected using a specifically pre-coded and pre-tested Designed Questionnaire which consisted of 3 categories: personal

information concerning mother and husband's socio-demographic factors, obstetric history of the mothers and checklists for maternal and neonatal complications. Interviews were conducted with the mothers after childbirth about personal (socio-demographic history) and obstetric history. Complications were recorded if present and medical records were used to revise the information.

Study variables

The study variables include age, mother's education, husband's education, mother's occupation, husband's occupation, family income, housing, residence and the region.

Data analysis

Data were analyzed using SPSS version 23, and each variable of the questionnaire was coded. All variables were summarized as percentage and frequency and Chi test was used to analyze data associated with maternal and neonatal outcomes.

Ethical consideration

Permission was obtained from the Ministry of Health and the medical director of the hospital, and a structured verbal consent was obtained from the participants.

RESULTS

Socio-demographic characteristics

A total of 384 people participated in this study. Data were collected from two sections (governmental and private) of Omdurman maternity hospital, 192 subjects from each. Most of the respondents (63.5%) were in the age group (20-30 years). The remaining 20.6 and 15.9% were in the age groups (more than 30 years) and (less than 20 years), respectively (Table 1). Investigation regarding age at marriage revealed that 67.7% of the respondents married at 20-30 years of age, 28.1% married at less than 20 years of age and the remaining 4.2% married at more than 30 years of age.

Regarding the residence of the respondents, 73.2% of them were from urban areas, 19% were from suburban areas and only 7.8% were from rural areas. Regarding housing, 57% of the respondents resided in their own house, 14.6% lived in a rented apartment and the remaining 28.4% reported other options than the above mentioned. Most of the respondents (71.4%) were housewives, 24.7% were employees and the remaining 3.9% were heavy physical laborers. Investigations regarding the occupations of their husbands revealed that 58.6% were self-employed, 39.6% were professional employees and only 1.8% were unemployed. Regarding the monthly income of the family, 67.7% reported that their monthly income was (≥3000), 24% reported that their monthly income was (≥1000-2999) and the remaining 8.3% reported that their monthly income was

(< 1000).

Region of the respondents

Investigations regarding the region of the respondents revealed that 121 (31.5%) came from central regions, whereas 104 (27.1%) came from the North, 87 (22.7%) came from the West, 68 (17.7%) came from the East, and only 4 (1%) came from the South, as shown in Figure 1.

Educational level of mothers

Regarding the educational level, 205(53.4%) of the respondents had university certificates, 86 (22.4%) had secondary education, 51 (13.3%) were at the primary level, 31 (8.1%) were illiterate and 11 (2.9%) had postgraduate certifications, as shown in Figure 2.

Educational level of husbands

Regarding their husbands' educational level, 223 (58.1%) were university graduates, 66 (17.2%) were illiterate, 49 (12.8%) were at secondary level, 31 (8.1%) had postgraduate certificates and at the primary level participants were 15 (3.9%), as shown in Figure 3.

Cross tabulation between the demographic characteristics of respondents and maternal complications

Cross tabulation between the demographic characteristics of respondents and maternal complications revealed significant association with the mothers' age groups, residence and family income, p value = 0.00001, 0.012 and 0.00001 respectively, as shown in Table 2.

### Cross tabulation between the demographic characteristics of respondents and newborn complications

Cross tabulation between the demographic characteristics of respondents and newborn complications revealed significant association with mother's age groups (p value = 0.0001) and occupation (0.0001) (Table 3).

Binary logistic regression

Binary logistic regression showed that participants with lower income contributed more to maternal complications 3.165(1.249-8.022) times statistically significant with P value of 0.015<0.05 (Table 4).

Table 1. Demographic characteristics of the respondents, (n = 384).

Characteristics	Frequency	Percentage
Age of the respondents		
Less than 20 years	61	15.9
20-30 years	244	63.5
More than 30 years	79	20.6
Age at marriage		
Less than 20 years	108	28.1
20-30 years	260	67.7
More than 30 years	16	4.2
Residence		
Urban	281	73.2
Suburban	73	19
Rural	30	7.8
Housing		
Owned	219	57
Hired (Rent)	56	14.6
Others	109	28.4
Mothers occupation		
Housewife	274	71.4
Employee	95	24.7
Heavy physical laborer	15	3.9
Husbands occupation		
Unemployed	7	1.8
Self Employed	225	58.6
Professional/ employee	152	39.6
Family income		
(< 1000)	32	8.3
(≥1000-2999)	92	24
(≥3000)	260	67.7
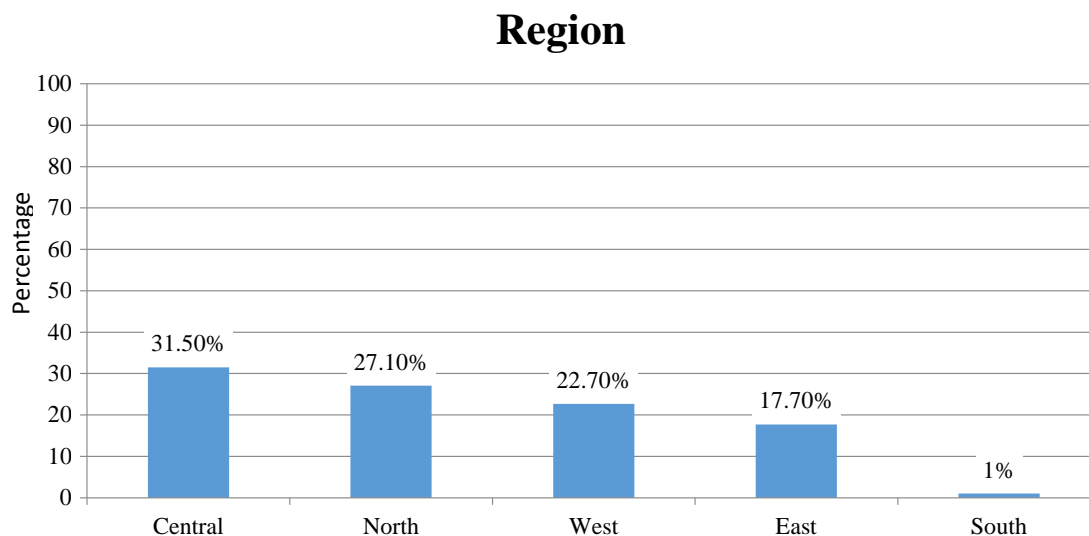
Region

Figure 1. Distribution of respondents according to their region (n = 384).
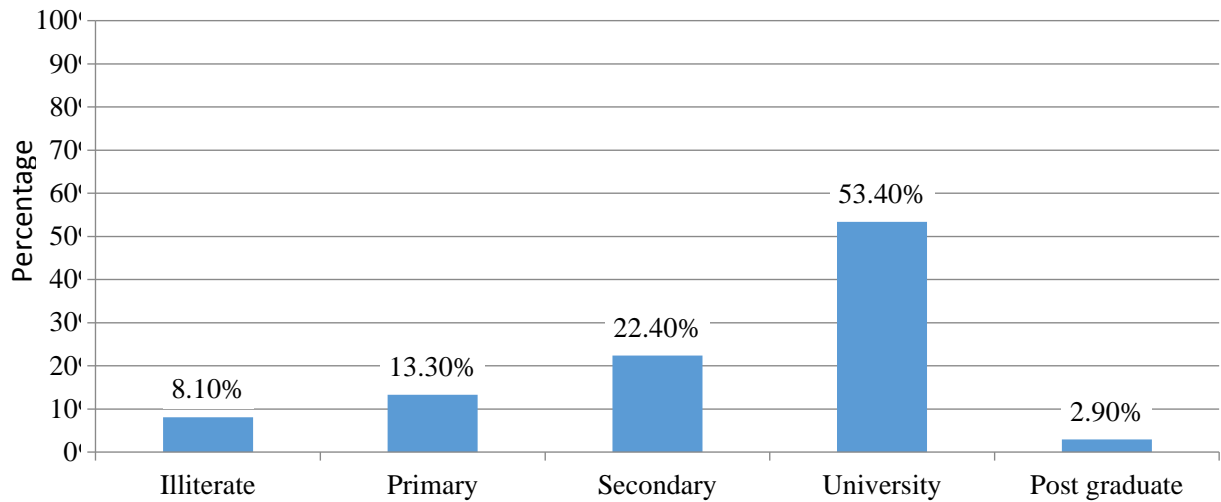
Level of education

Figure 2. Distribution of respondents according to their level of education (n = 384).
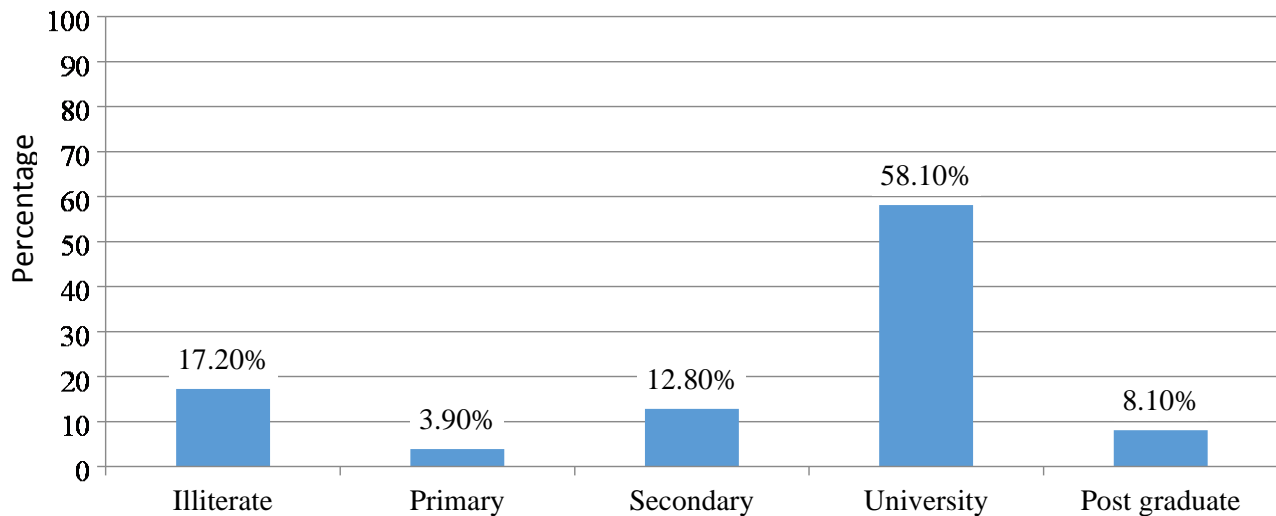
Husband's education

Figure 3. Distribution of respondents according to their husband's educational level (n = 384).

DISCUSSION

The aim of this study is to assess the effect of maternal age and socio-demographic factors on maternal and prenatal outcomes. The results showed that participants with lower income are more likely to develop serious maternal complications 3.165(95% CI 1.249-8.022). This was statistically significant with (P value = 0.015). It was found that there is significant association between maternal complications and the mother's age groups,

residence and family income, when p value = 0.00001, 0.012 and 0.00001, respectively. These findings are similar to the results of many research conducted in developing countries. Some WHO studies showed that more adverse outcomes occurred in low and middle income countries (Ganchimeg et al., 2014). Another similar study showed that maternal complications have strong relationship with low socio-economic status (P < 0.05), and participants with low socio-economic factors have more adverse outcomes (Althabe et al., 2015).

Table 2. Cross tabulation between the demographic characteristics of the respondents and the mothers complications, (n = 384).

Variables		Mother's complications		P value
		Yes	No	
Mother's age groups	Less than 20 years	44 72.10%	17 27.90%	0.00001
	20-30 years	62 25.40%	182 74.60%	
	More than 30 years	45 57.00%	34 43.00%	
Residence	Urban	99 35.20%	182 64.80%	0.012
	Suburban	34 46.60%	39 53.40%	
	Rural	18 60.00%	12 40.00%	
Level of education	Illiterate	26 83.90%	5 16.10%	0.306
	Primary	28 54.90%	23 45.10%	
	Secondary	30 34.90%	56 65.10%	
	University	63 30.70%	142 69.30%	
	Post graduate	4 36.40%	7 63.60%	
Occupation	Housewife	112 40.90%	162 59.10%	0.393
	Employee	32 33.70%	63 66.30%	
	Heavy physical laborer	7 46.70%	8 53.30%	
Family Income (SDG)	(< 1000)	22	10	0.00001

Table 3. Cross tabulation between the demographic characteristics of the respondents and the newborns complications, (n = 384).

Variables		Newborn's complications		Fisher's Exact Test P value
		Yes	No	
Mother's age groups	Less than 20 years	37 60.70%	24 39.30%	0.0001
	20-30 years	37 15.20%	207 84.80%	
	More than 30 years	32 40.50%	47 59.50%	
Residence	Urban	73 26.00%	208 74.00%	0.244
	Suburban	21 28.80%	52 71.20%	

Table 3. Cont'd

	Rural	12 40.00%	18 60.00%	
Level of education	Illiterate	18 58.10%	13 41.90%	0.279
	Primary	24 47.10%	27 52.90%	
	Secondary	20 23.30%	66 76.70%	
	University	42 20.50%	163 79.50%	
	Post graduate	2 18.20%	9 81.80%	
Occupation	Housewife	82 29.90%	192 70.10%	0.0001
	Employee	22 23.20%	73 76.80%	
	Heavy physical laborer	2 13.30%	13 86.70%	
Family Income (SDG)	(< 1000)	16 50.00%	16 50.00%	0.231
	≥1000 - 2999)	25 27.20%	67 72.80%	
	(≥3000)	65 25.00%	195 75.00%	

Table 4. Binary logistic regression for prediction mother's complications, (n = 384).

Variables in the equation	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Mother's age (Years)	0.227	0.1	5.163	1	0.023	1.254	1.032	1.525
Age at marriage (Years)	-0.19	0.114	2.768	1	0.096	0.827	0.661	1.034
Residence	0.353	0.363	0.946	1	0.331	1.423	0.699	2.897
Level of education	-1.105	0.646	2.93	1	0.087	0.331	0.093	1.174
Occupation	0.216	0.326	0.438	1	0.508	1.241	0.655	2.353
Family Income (SDG)	1.152	0.474	5.897	1	0.015	3.165	1.249	8.022
How many deliveries have you had	-0.098	0.162	0.367	1	0.545	0.907	0.66	1.245
Did you receive iron and folic acid during this pregnancy	-0.031	0.661	0.002	1	0.963	0.97	0.265	3.542
Were you antenatal care attendant	1.322	0.58	5.203	1	0.023	3.752	1.205	11.689
Newborn's complications	2.262	0.312	52.586	1	0.0001	9.604	5.211	17.7
Hospital	0.725	0.424	2.932	1	0.087	2.065	0.900	4.736

In developed countries such as the United States, two studies concluded with similar findings with regard to adverse outcomes among mothers in the low income sector of the society (Harville et al., 2012). We found a significant association between neonatal adverse outcomes with mother's age groups (p value = 0.0001) and occupation (0.0001). This finding was confirmed by other studies in different parts of the world (Doh et al.,

2008; Braimoh et al., 2012).

Conclusion

Data and outcomes from this study revealed a great association between maternal age, socio-demographic factors (level of income, level of education, occupation and residence) and maternal and neonatal adverse outcomes. These findings are in agreement with those reported in some studies conducted in developing and developed countries. Reducing the rates of adverse pregnancy outcomes among too young or too old expectant mothers is not an easy mission, considering that it is complicated. This study showed that most of the adverse outcomes associated with mothers and their neonates could be avoided. This should be reached by achieving high levels of education and by improving the socioeconomic condition. All these measures could help decrease adverse outcomes and improve maternal and child health.

ABBREVIATIONS

CI, Confidence Interval; **IUGR,** Intrauterine growth restriction; **LBW,** Low birth weight; **NSVD,** Normal spontaneous vaginal delivery; **US,** United States; **WHO,** World Health Organization.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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